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(54) **TRACK SLOT FASTENER**

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(63) Continuation of application No. 10/734,678, filed on Dec. 15, 2003, now Pat. No. 7,175,377, which is a continuation-in-part of application No. 10/336,033, filed on Jan. 3, 2003, now Pat. No. 6,827,531.

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(52) **U.S. Cl.** **410/105**; 410/104; 410/106

(58) **Field of Classification Search** ..... 410/12, 410/104–106, 110; 248/499; 24/115 K, 24/265 CD; 224/324; 114/218
See application file for complete search history.

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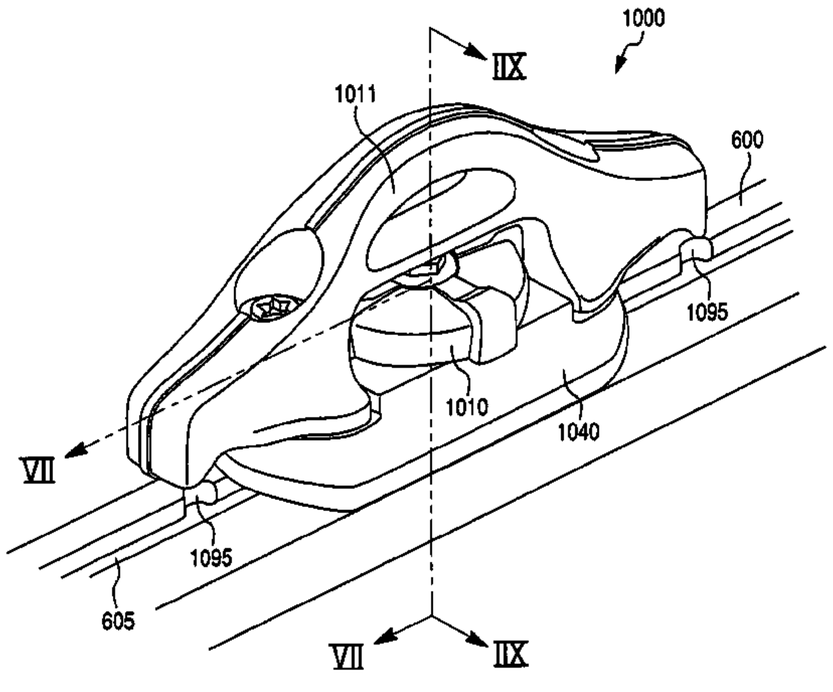
(57) **ABSTRACT**

A fastener assembly secures loads to a track in a truck bed and is retainable within a track slot of the track. The fastener assembly may include a retainer adapted to fit at least partly within a track slot and a rotatable handle operating on the retainer, the rotatable handle being rotatable between at least an engagement position and a release position. A pressure applicator is positioned between the track and the rotatable handle, the pressure applicator having a bottom surface for applying a pressure on a top surface of the track in response to the position of the rotatable handle. The pressure applicator includes at least one projection projecting from an interior region of the bottom surface and adapted to engage a positioning scallop of the track.

10 Claims, 10 Drawing Sheets



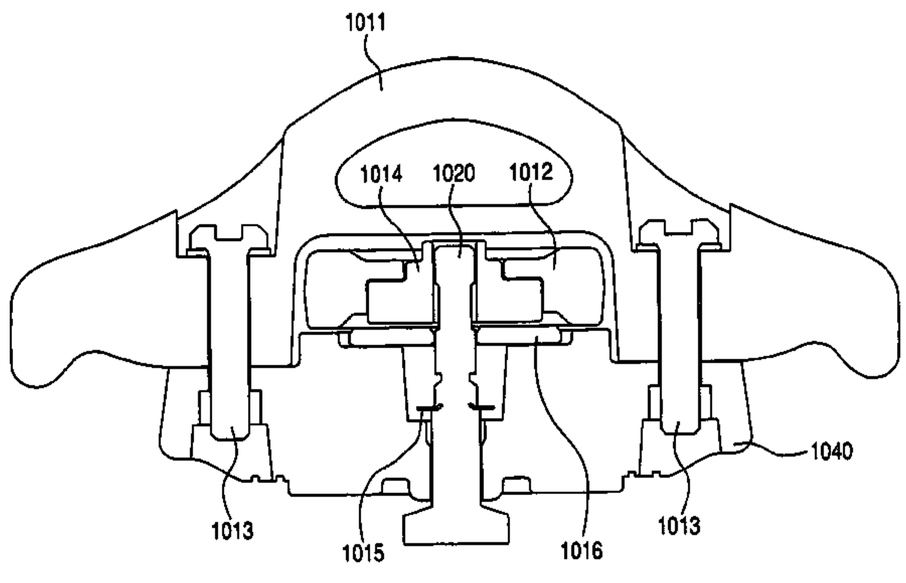


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Fig. 1

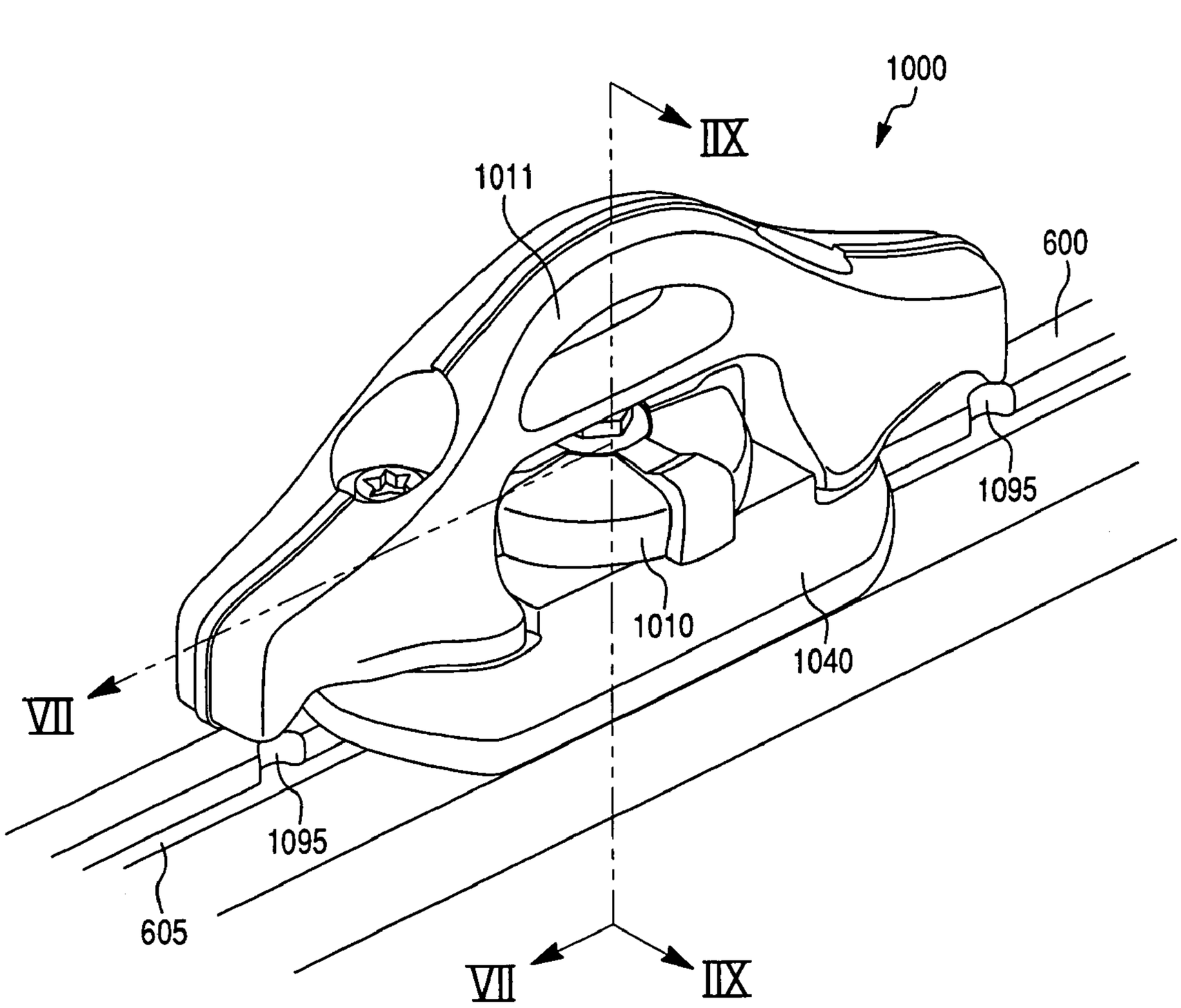

Fig. 2

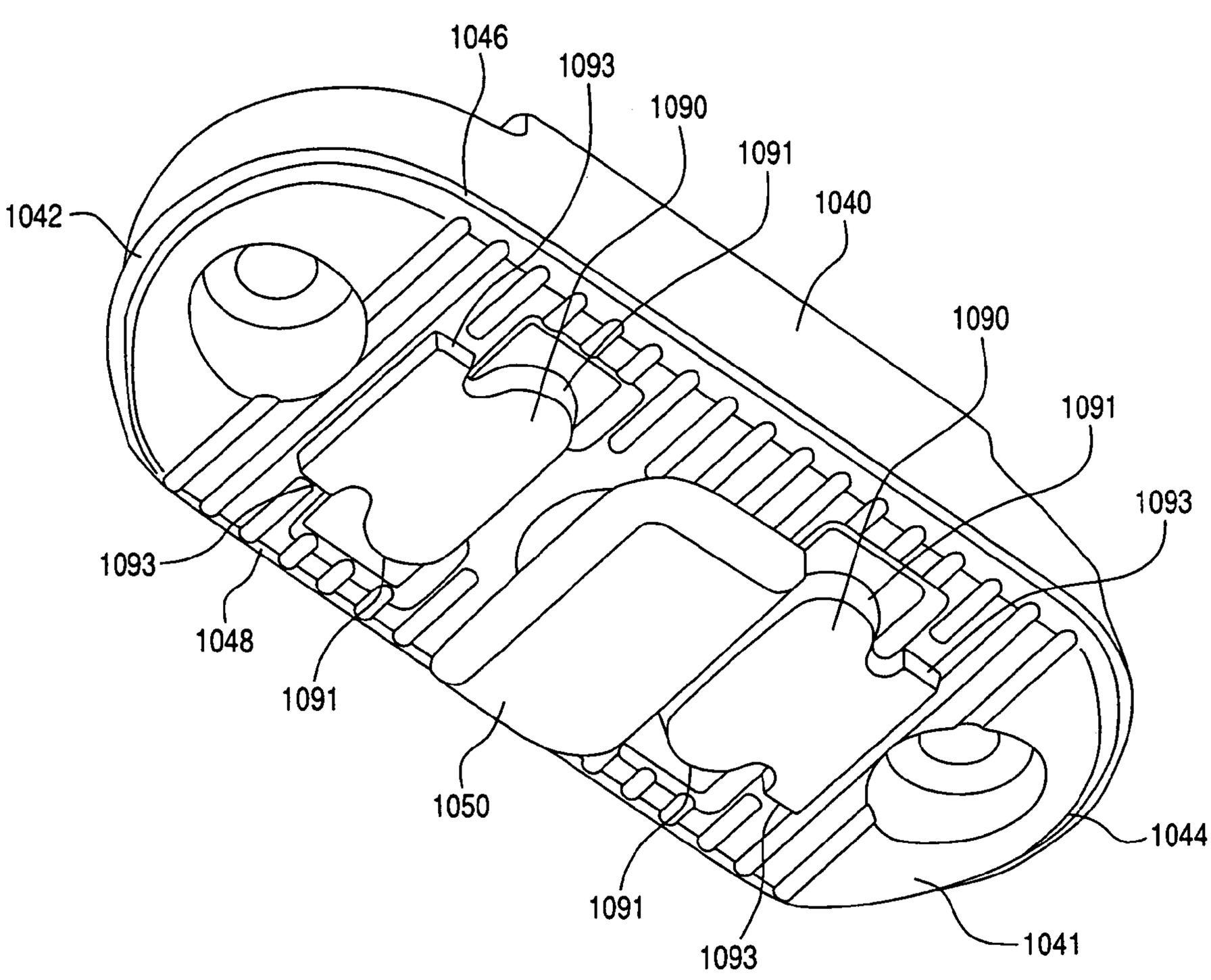
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Fig. 3

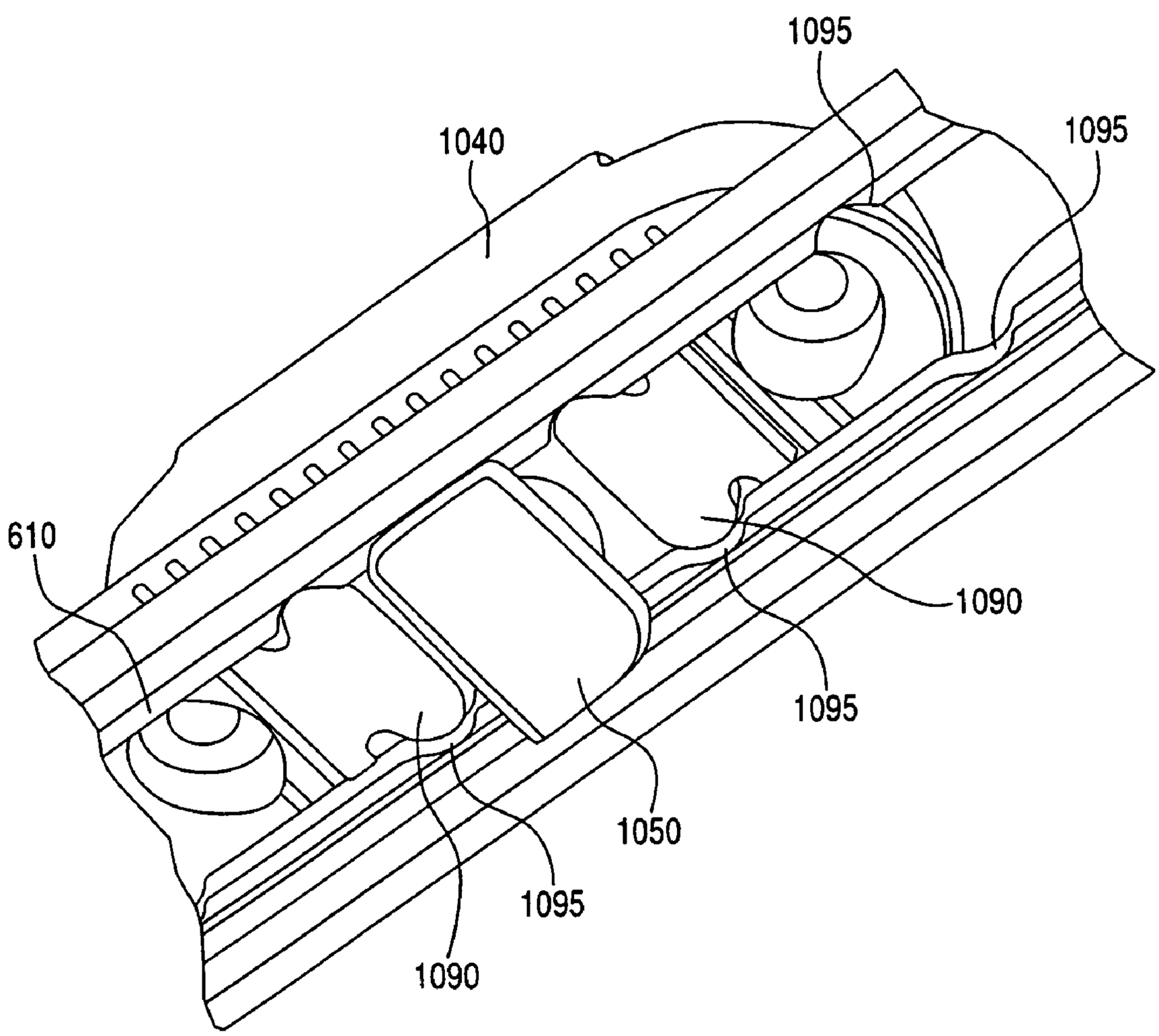


Fig. 4

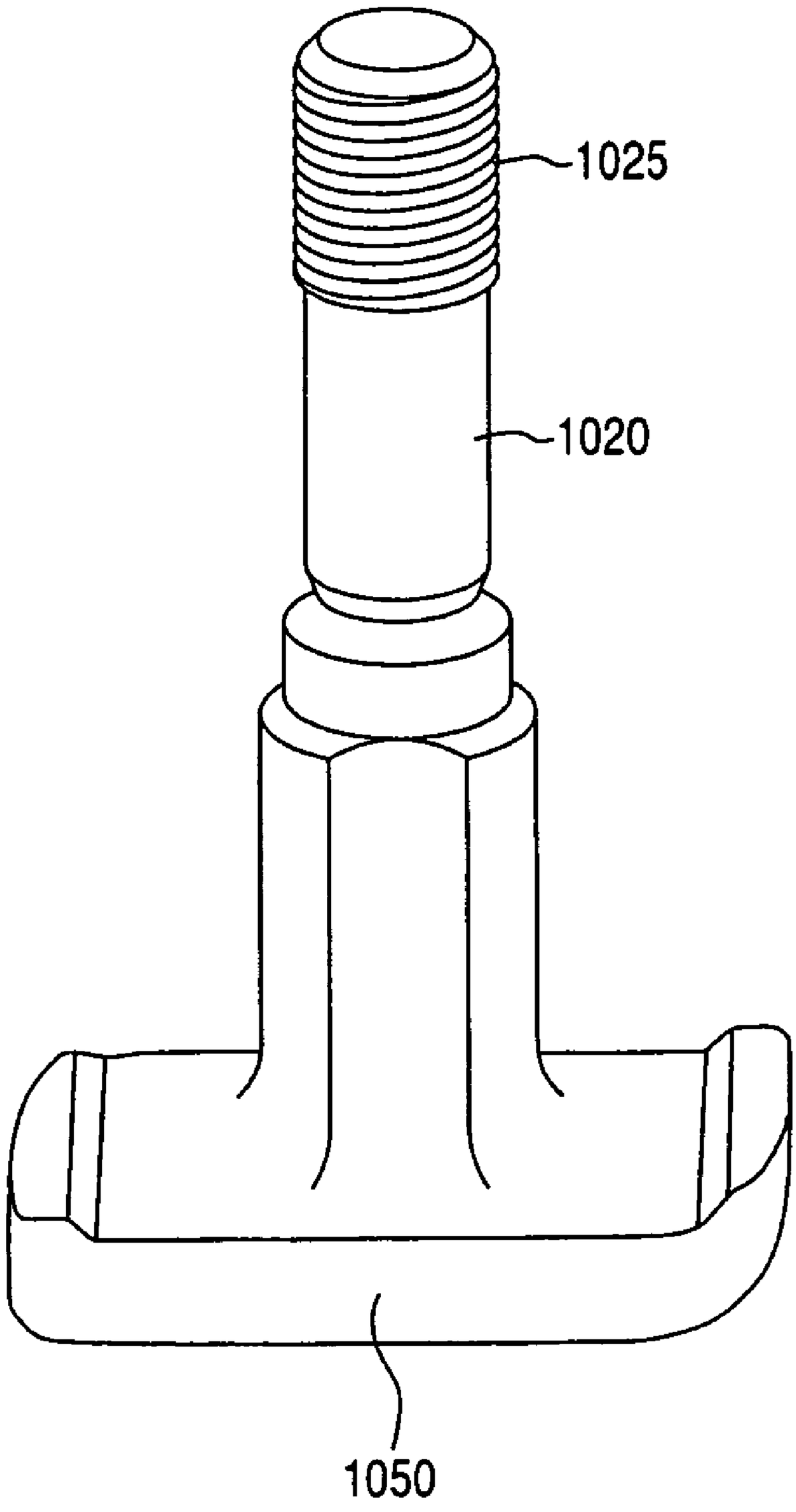
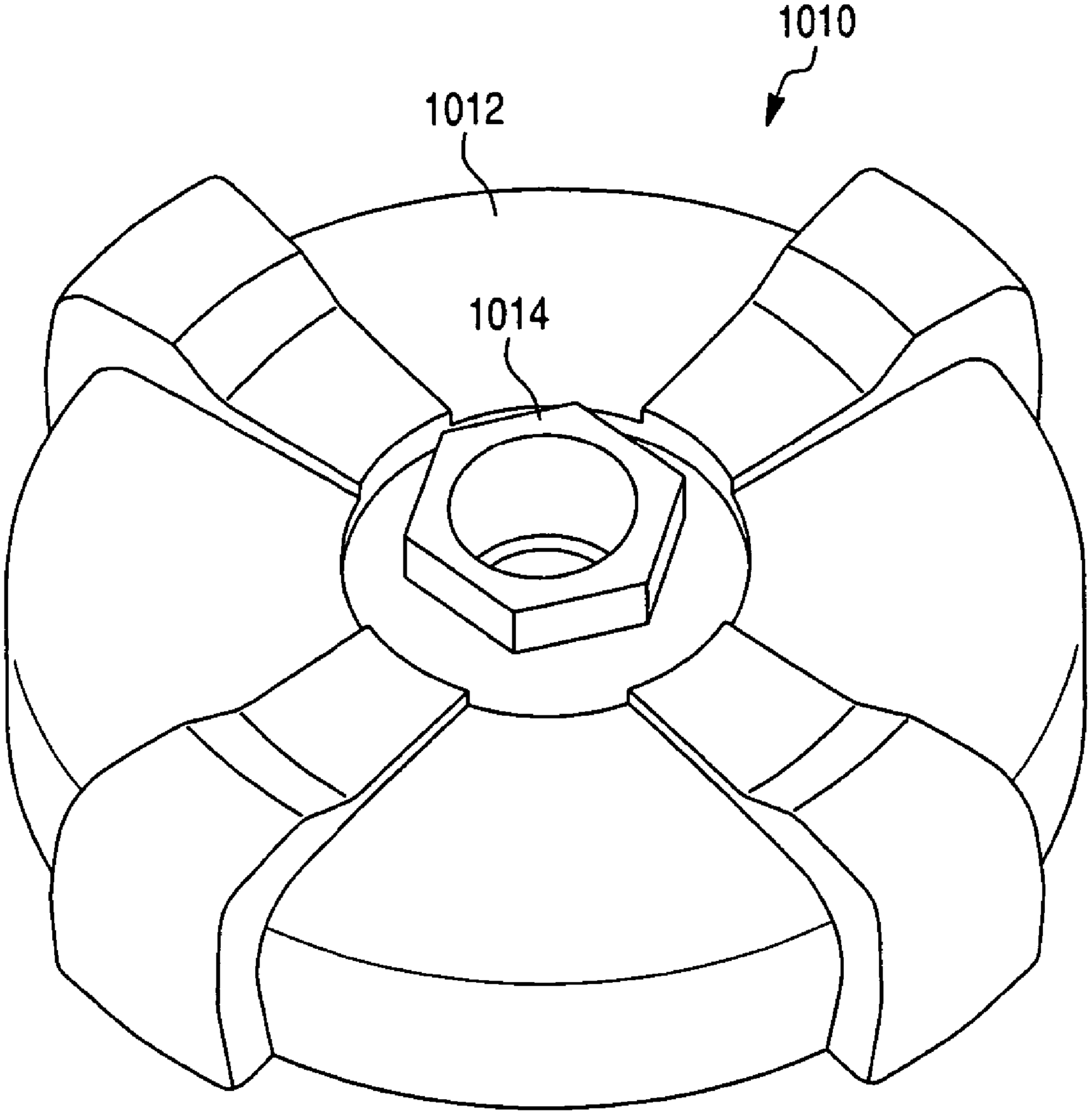


Fig. 5



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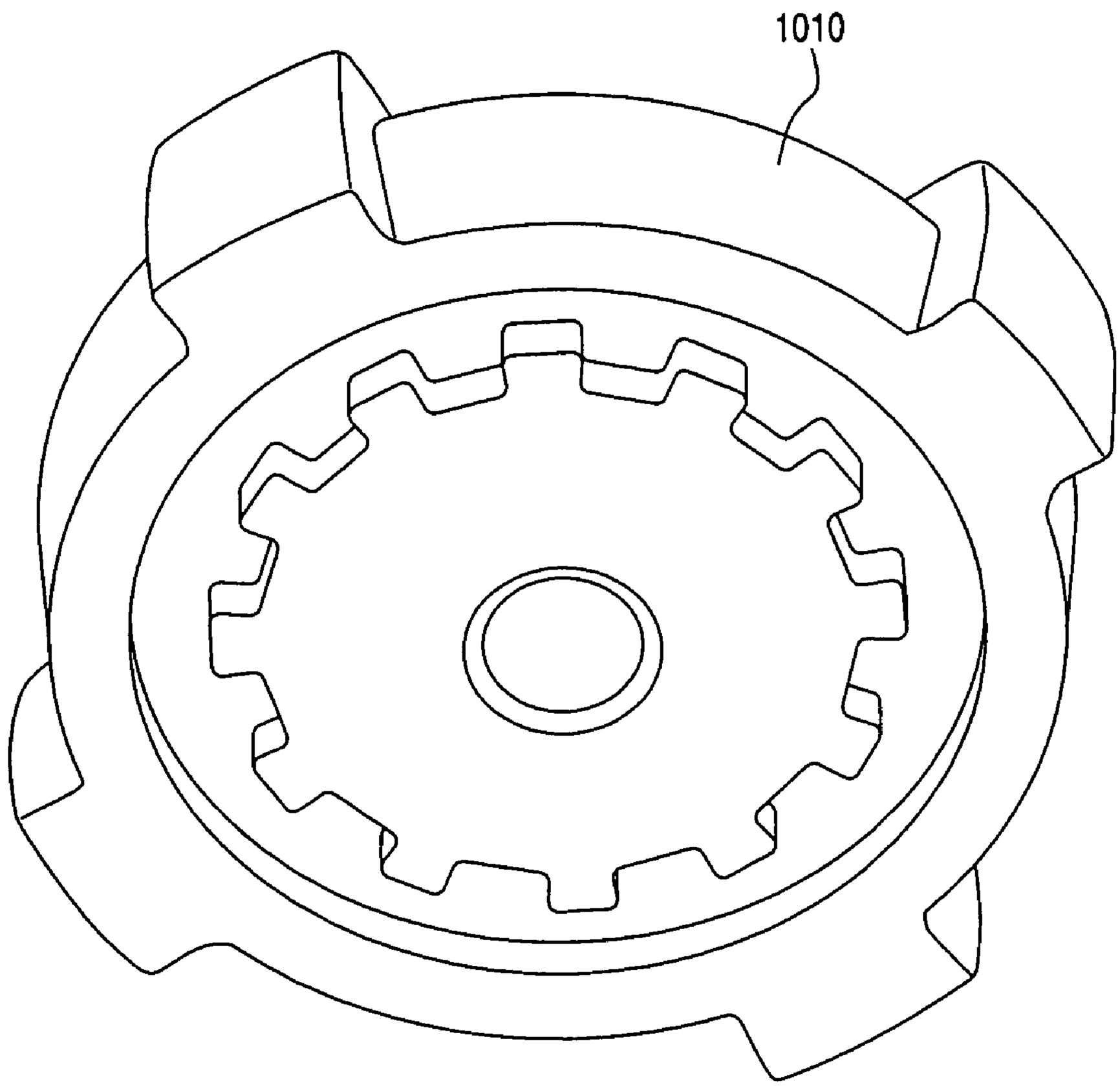


Fig. 7

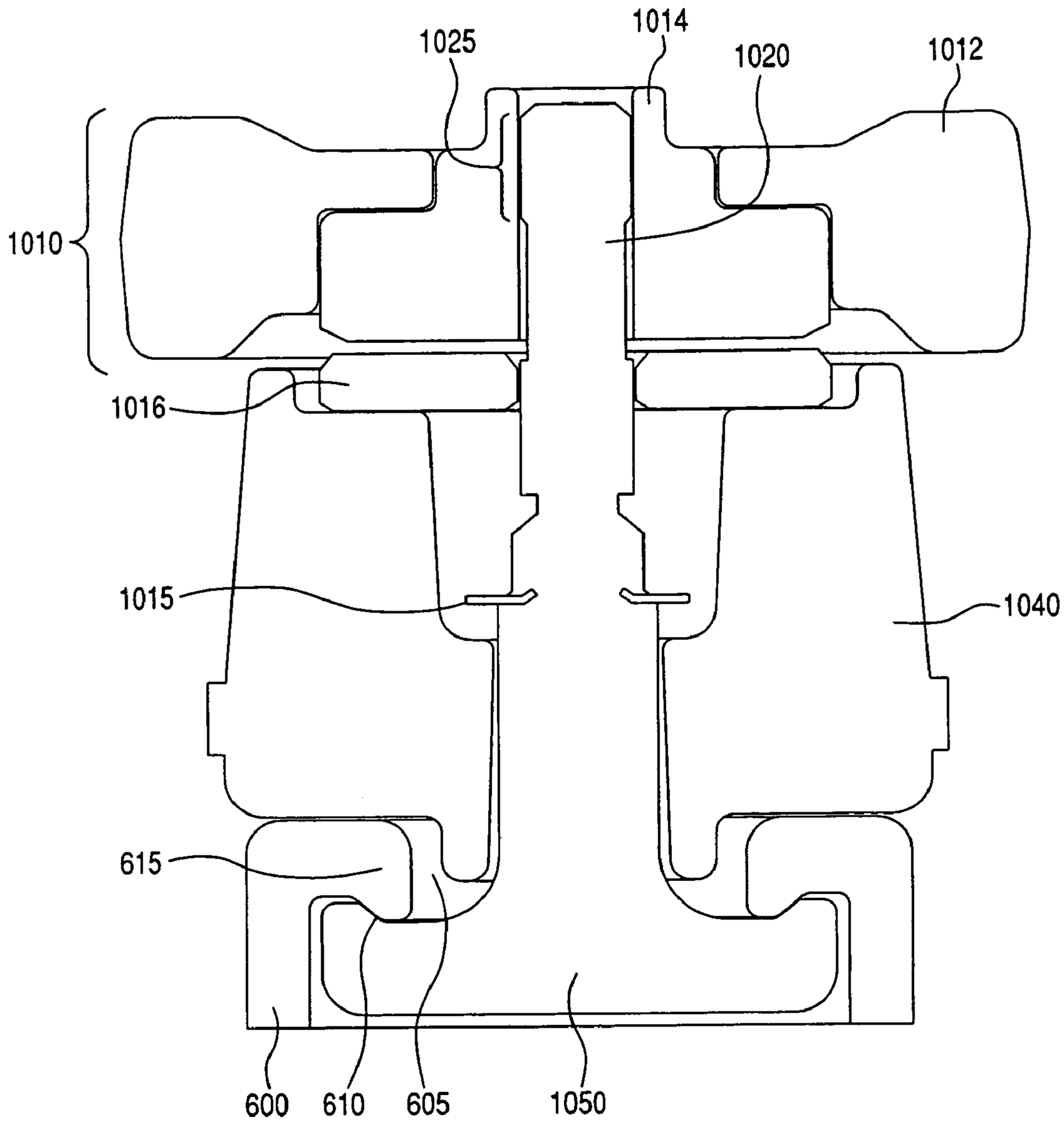


Fig. 8

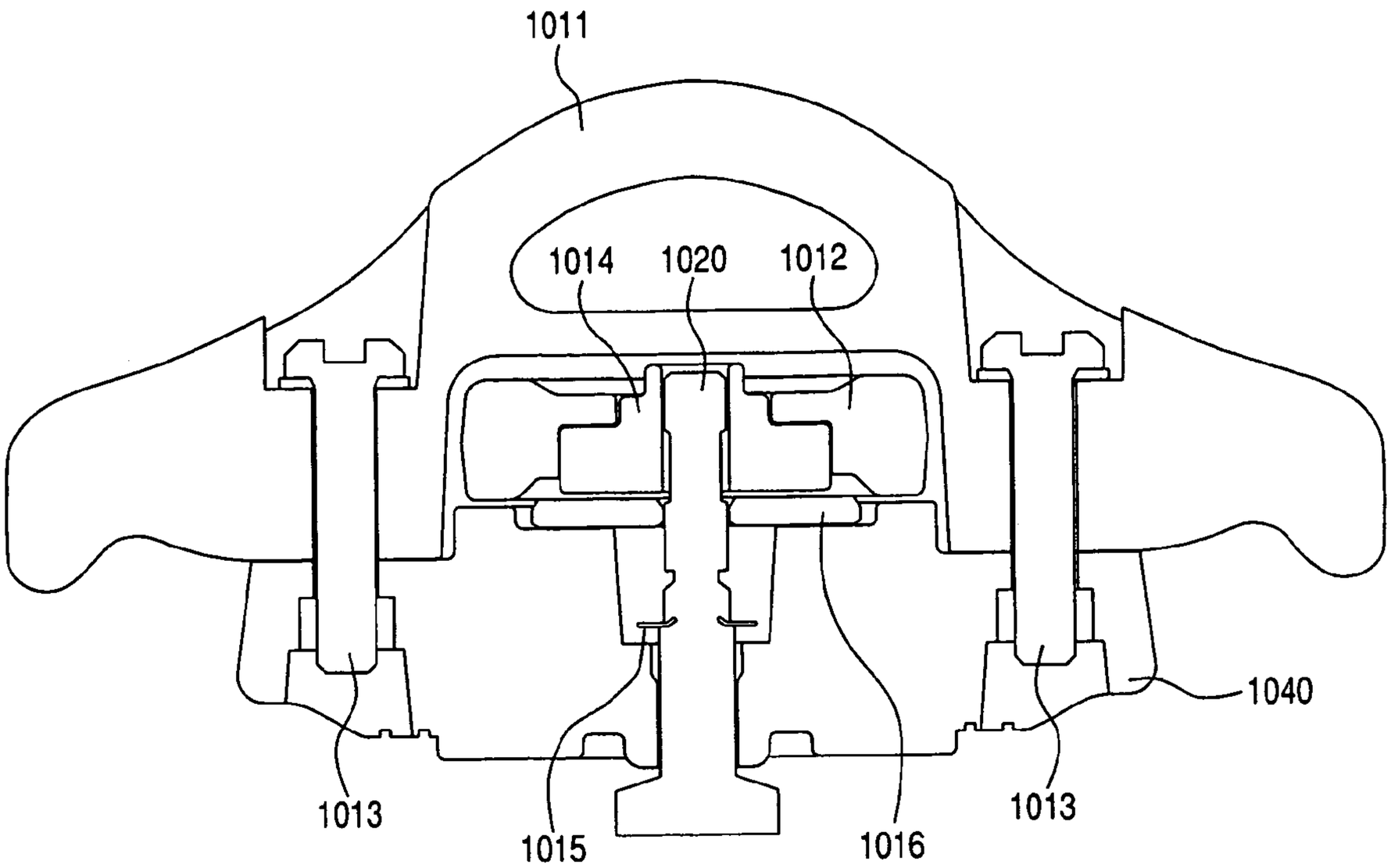


Fig. 9

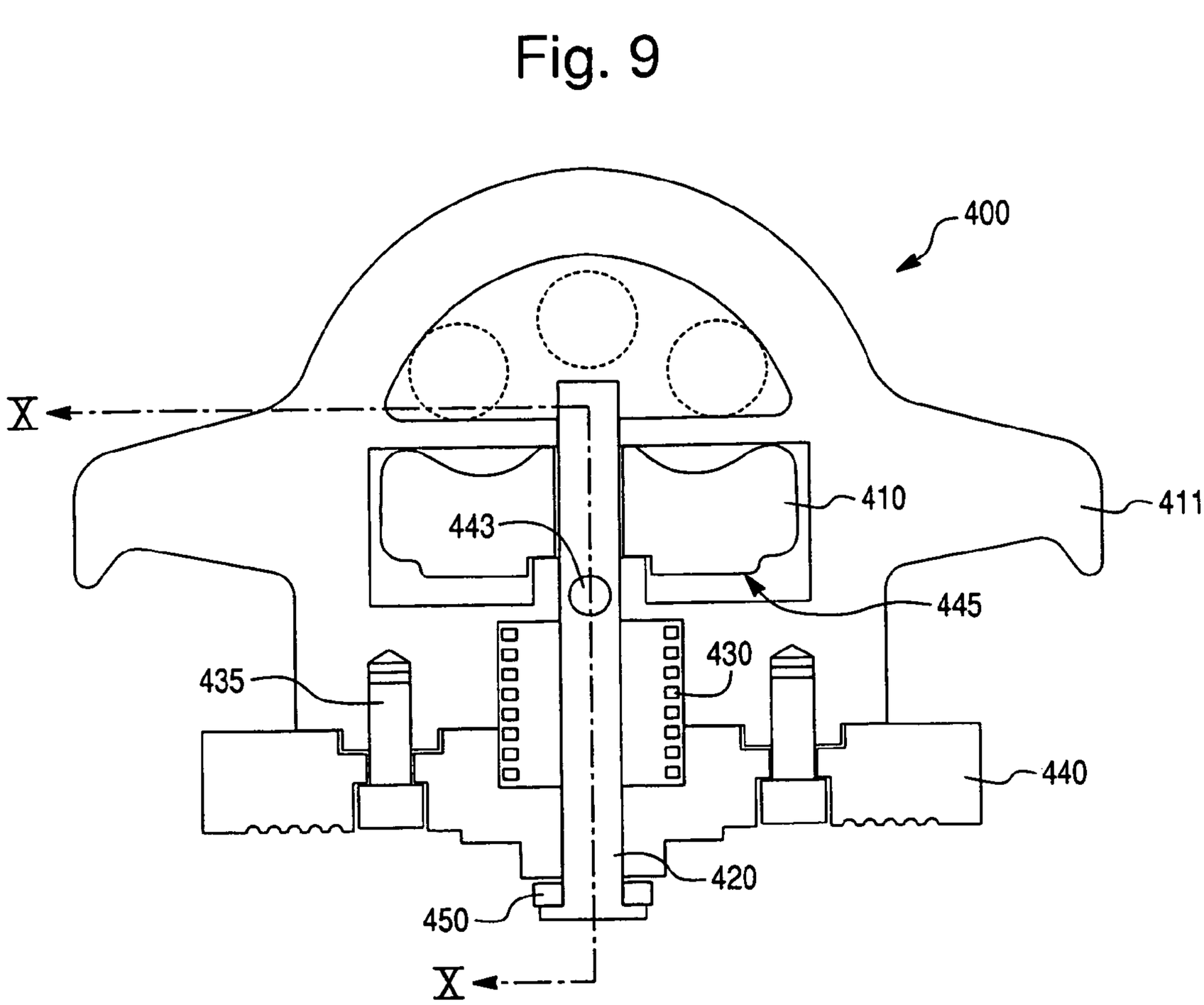
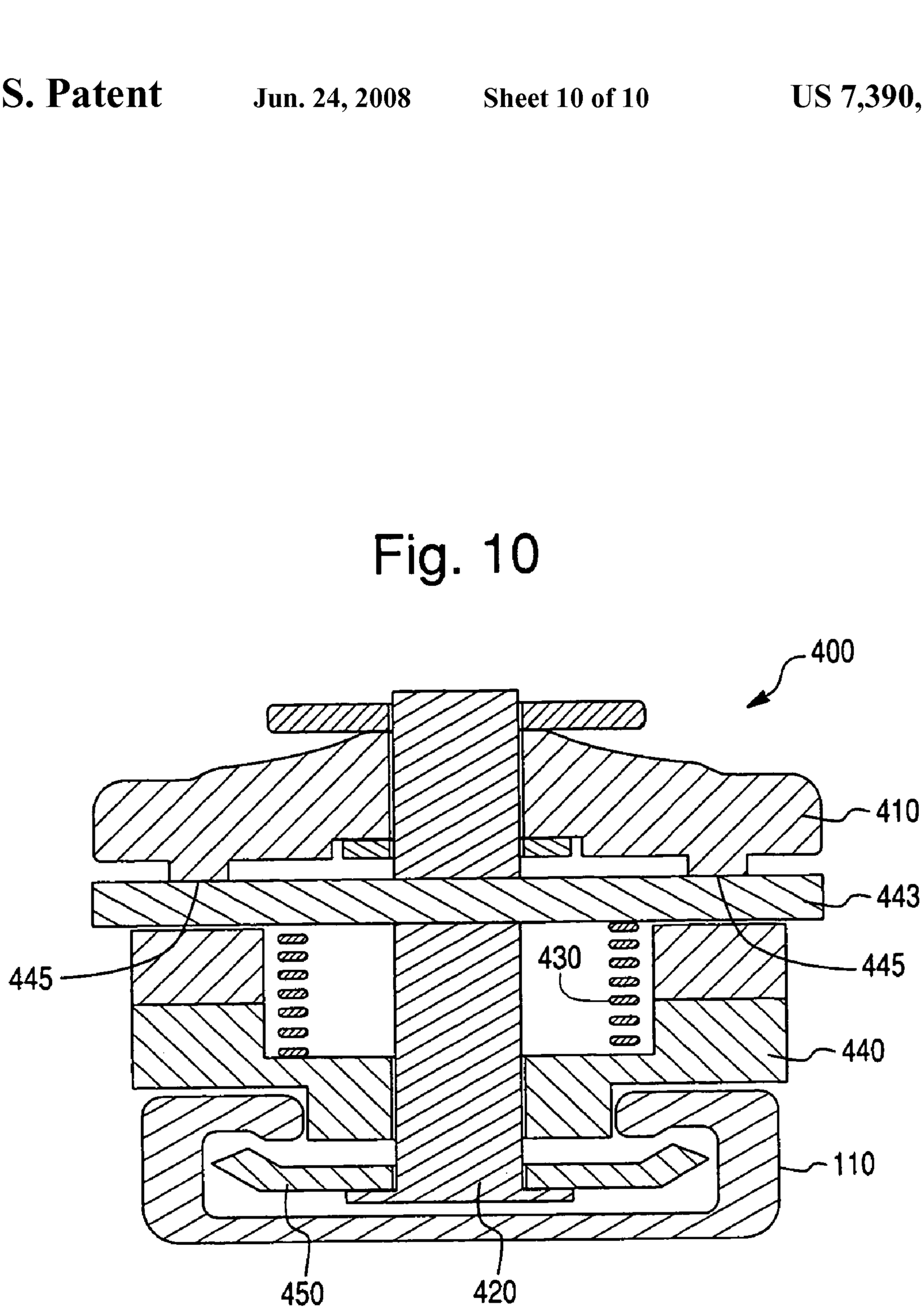


Fig. 10



TRACK SLOT FASTENER

CORRESPONDING RELATED APPLICATIONS

The present application is a continuation of U.S. application Ser. No. 10/734,678, filed Dec. 15, 2003, now U.S. Pat. No. 7,175,377, which is incorporated by reference herein in its entirety, which is continuation in part of U.S. application Ser. No. 10/336,033 filed on Jan. 3, 2003, now U.S. Pat. No. 6,827,531, which is incorporated by reference herein in its entirety. Additionally, the present application is related to U.S. application Ser. No. 09/874,979 filed on Jun. 7, 2001, and U.S. application Ser. No. 10/109,051 filed on Mar. 29, 2002 by Mark D. Snyder et al., which are incorporated by reference herein in their entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to fasteners for securing loads to a track, and more particularly, to adjustable fasteners for securing loads to a track mounted in or near a truck bed.

2. Background of the Invention

Fasteners for securing loads to framing, tracks, and channels have been commercially available for some time. Some conventional fasteners used in automotive track applications will be briefly described below.

Conventional track fasteners have been designed to be removable and/or relocateable along a track slot length. Many of these conventional track fasteners employ a rotatable locking base portion that engages locking teeth inside the track slot or on a locking mechanism to securely retain the fastener within the track slot, and to facilitate relocation along the track slot length. These devices, however, can be difficult to install and use, which detracts from their desirability in consumer environments such as original equipment manufactured (OEM) vehicles such as pickup trucks, mini-vans, sport-utility vehicles or other vehicles. Often, conventional track fasteners can only be loaded from an end of the track slot, because their design does not facilitate top down loading, and are thus difficult to replace if broken. Also problematic, many of these fasteners have limited load capacities, such as fasteners available on roof racks, and are thus unsuitable for applications such as truck beds and cargo areas where heavier loads are placed.

Other conventional track fasteners (e.g., U.S. Pat. Nos. 4,410,298, 4,784,552, and Re. 36,681, which are incorporated by reference herein in their entirety) have been designed with a center through bolt to apply pressure between a top plate mounted above the track slot and a base plate mounted within the track slot. The bolt can be tightened to clamp the fastener in place, thereby securely retaining the fastener within the track slot, or loosened to allow relocation along the track slot length. Clamp styled fasteners are often used to temporarily attach rails to the top side of a truck bed for tonneau covers and the like, and generally allow relocation along the length of the track slot. These devices, however, often require a user to have a wrench to loosen or tighten the bolt, which detracts from their ease of use.

Thus, a need exists for an improved track slot fastening device.

SUMMARY OF THE INVENTION

The present invention is directed to overcoming or at least reducing the effects of one or more of the problems set forth above and other problems in the prior art.

According to embodiments of the invention described below, there is provided a fastener assembly for securing loads to a track, the fastener assembly being retainable within a track slot of the track. The fastener assembly may include a retainer adapted to fit at least partly within a track slot and a rotatable handle operating on the retainer, the rotatable handle being rotatable between at least an engagement position and a release position. A pressure applicator is positioned between the track and the rotatable handle, the pressure applicator having a bottom surface for applying a pressure on a top surface of the track in response to the position of the rotatable handle. The pressure applicator includes at least one projection projecting from an interior region of the bottom surface and adapted to engage a positioning scallop of the track.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing advantages and features of the invention will become apparent upon reference to the following detailed description and the accompanying drawings, of which:

FIG. **1** is a perspective view of a fastener assembly according to an embodiment of the present invention;

FIG. **2** is a bottom perspective view of the fastener assembly of FIG. **1**;

FIG. **3** is a bottom perspective view of the fastener assembly of FIG. **1** mounted on a track slot with the track slot cut in a mid-region to show an interface between the fastener assembly and the track slot;

FIG. **4** is a perspective view of a shaft coupled to a retainer according to an embodiment of the present invention;

FIG. **5** is a top perspective view of a rotatable handle according to an embodiment of the present invention;

FIG. **6** is a bottom perspective view of the rotatable handle of FIG. **5**;

FIG. **7** is a sectional view of the fastener assembly of FIG. **1** viewed from plane VII-VII;

FIG. **8** is a sectional view of the fastener assembly of FIG. **1** viewed from plane IIX-IIX;

FIG. **9** is a sectional view of a fastener assembly with ramped or angled portions according to another embodiment of the present invention; and

FIG. **10** is a partial sectional view of the fastener assembly of FIG. **9** viewed from plane X-X.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to presently preferred embodiments of the invention. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

The following description of the present invention will describe implementations of the present invention in reference to a track slot used in a truck bed. One such implementation is described in copending U.S. patent application Ser. No. 09/874,979 filed Jun. 7, 2001, by Michael D. Anderson et al., which is incorporated by reference herein in its entirety. Additional improvements and variations are described in the aforementioned corresponding related applications. Other implementations are also contemplated, as would be readily apparent to one of skill in the art after reading this disclosure.

It should be appreciated that the term track slot as used in the present specification refers to the entire internal volume of the track. Hence, track slot includes the space substantially between two upper inwardly protruding portions at the top of the track, and the volume underneath the protruding portions to a bottom surface of the track. It should also be appreciated

that the term load as used in the present specification refers to a force applied to a fastener assembly by an object secured thereto. This load may include, for example, a horizontal force acting substantially along a plane of a vehicle body, a vertical force acting upwards and away from the aforementioned plane of the vehicle body, or a combination of the two.

A fastener assembly **1000** retainable within a track slot **605** of a track **600** according to a first embodiment of the present invention is shown in FIGS. **1** through **8**. The fastener assembly **1000** includes a rotatable handle **1010**, such as a thumb-wheel, which is shown best in FIGS. **5** and **6**. The rotatable handle **1010** is disposed within an outer tie down **1011** for securing loads to the fastener assembly **1000**. The rotatable handle **1010** is operably connected to a retainer **1050** by way of a shaft **1020**. Retainer **1050** is configured to function in conjunction with a pressure plate **1040** to apply a mechanical clamping force on the track **600** when in an engaged or locked configuration.

According to the first embodiment of the present invention as shown in FIG. **2**, a plurality of projections **1090** are configured to extend from a bottom surface **1041** of pressure plate **1040**. Preferably, the projections **1090** extend from a region located generally in the interior of the bottom surface **1041** of pressure plate **1040**. In this configuration, the projections **1090** may be spaced from one or both of the ends **1042** and **1044** of pressure plate **1040** and from one or both of sides **1046** and **1048** of pressure plate **1040**, or a plurality of combinations thereof. It can be appreciated that spacing the projections **1090** an approximately equal distance on opposite sides of shaft **1020** will ensure an equal load distribution across the bottom surface of the pressure plate **1040**. Preferably, projections **1090** are positioned in a configuration shown in FIG. **2**.

The projections **1090** may include four periphery portions **1091** formed in a shape conforming to that of scallops **1095** in track **600** to promote engagement therebetween and slot guide portions **1093** to further assist in positioning the fitting in the track. A clearance may also be provided to facilitate ingress and egress of the projections **1090**. In the embodiment of the invention shown in FIGS. **1** to **8**, the scallops are in the shape of a portion of a circle having a radius of about 5 mm (such as 5.37 mm) and thus each of the four periphery portions **1091** are in the shape of a portion of a circle having a radius of about 5 mm. In this particular embodiment, the non-scalloped portion of the top of the track slot is about 21 mm wide (such as 21.45 mm) and thus portions **1093** on each projection **1090** are spaced apart about 21 mm. In this particular embodiment, the centers of curvature of adjacent scallops are about 40 mm apart and thus the centers of curvature of the portions **1091** are about 40 mm apart. Other variations are also plausible, as will be readily apparent to one of ordinary skill in the art after reading this disclosure. For example, the scallops and periphery portions can have other arc-shaped geometries in addition to circular geometries. Projections **1090** are illustrated to project from pressure plate **1040** at an angle of 90° from the bottom surface **1041**. However, it is contemplated that the projections **1090** may extend at a variety of angles to increase engagement with corresponding scallops **1095**.

As shown in FIGS. **5** through **8**, the rotatable handle **1010** may be formed of a multi-piece or multi-section construction. By way of example, the rotatable handle **1010** may include a top **1012** including a threaded nut **1014**, for translating the threaded portion **1025** of shaft **1020**, and a washer **1016** which prevents rotation and rocking of shaft **1020**. This multi-piece or multi-section construction allows the rotatable handle **1010** to be easily assembled and manufactured. Also, shown in FIG. **8** are fasteners **1013**, which hold the tie-down portion **1011** to pressure plate **1040** and a clip **1015** which retains the shaft **1020** to the rest of the fitting.

In order to insert the fastener assembly **1000** in track **600**, the longitudinal axis of the fastener assembly **1000** is initially placed transverse to the longitudinal axis of the track **600**. Next, the retainer **1050** is positioned such that the longer axis is oriented parallel to and above the slot. The retainer **1050** is then placed in the longitudinally extending slot **605** of the track **600**. The fastener assembly **1000** is then rotated 90° in the clockwise or counterclockwise direction, thus aligning with track **600** so that the retainer **1050** is also rotated 90°. In this manner, the fastener assembly **1000** can be inserted in track **600** in a top-down method and easily secured to the track **600**.

To secure fastener assembly **1000** to track **600**, the fastener assembly **1000** is first inserted in the track **600**, as described above. Next, the fastener assembly **1000** is placed along the track **600** such that projections **1090** engage corresponding scallops **1095** formed in the track **600**. The rotatable handle **1010** is then rotated clockwise about a central axis defined by shaft **1020**, which in turn rotates a central threaded portion **1014** of the rotatable handle **1010**. Rotation of the rotatable handle **1010** operates to translate the threaded portion **1025** of shaft **1020**, thereby translating shaft **1020** relative to rotatable handle **1010**. As the shaft **1020** is translated the retainer **1050**, which is coupled to the shaft **1020**, contacts a lower surface **610** of a flange **615** formed on the track **600**. The retainer **1050** and pressure plate **1040** combine to exert a clamping force on the track **600**, thereby retaining the fastener assembly **1000** in a secured position on track **600**. In this manner, the fastener assembly **1000** can be securely coupled to the track **600** in a plurality of locations along the track **600** for fastening loads thereto.

A fastener assembly **400** retainable within a track slot of a track **110** according to a second embodiment of the present invention is shown in FIGS. **9** and **10**. A portion of FIG. **9** viewed from plane X-X is shown in greater detail in FIG. **10**. The fastener assembly **400** according to this embodiment includes a rotatable handle **410**, such as a thumb-wheel, within an outer tie down **411** for securing loads to the fastener assembly **400**. The rotatable handle **410** operates retainer **450** via shaft **420**. A spring **430** is provided in a space between the rotatable handle **410** and a pressure plate **440**, such that the spring **430** applies a vertical force on a pin **443** with respect to the pressure plate **440**. The pressure plate **440** is secured to the tie down **411** by screws **435**.

To operate the fastener assembly **400**, the rotatable handle **410** includes an angled running surface **445** interfacing pin **443**. As the rotatable handle **410** is rotated between a locked position and a released position, the angled running surface **445** vertically displaces the pin **443** which is coupled to the retainer **450** by shaft **420**. The rotatable handle **410** is limited in vertical displacement due to intersecting a portion of the outer tie down **411**.

The interface between the angled running surface **445** and the pin **443** may be formed to prevent overtightening of the fastener assembly **400** and to default to a tightened condition during partial tightening of the rotatable handle **410**. By way of example, the angled running surface **445** may include a notch (not shown) for receiving the pin **443** at a loosened state near the top of the angled running surface **445**. If an operator only partially loosens the fastener assembly **400**, thereby not engaging the notch, the spring **430** forces the pin **443** to slide down the angled running surface **445** into a tightened or engaged position. To prevent overtightening, the spring **430** is configured to apply the maximum retention force on the

retainer **450** when the pin **443** is at the bottom of the angled running surface **445**. Therefore, overtightening may be prevented and default engagement may be achieved by the present invention.

The foregoing description of preferred embodiments of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention. For example, other types of retainers such as nuts or other fasteners may be used. The embodiments were chosen and described in order to explain the principles of the invention and its practical application to enable one skilled in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined with reference to the claims appended hereto, and their equivalents.

What is claimed is:

1. A fastener assembly for securing loads to a track, the fastener assembly being retainable within a track slot of the track, the fastener assembly comprising:

a retainer adapted to fit at least partly within the track slot;

a rotatable handle operating on the retainer via a shaft, the rotatable handle being rotatable between at least an engagement position and a release position;

a pressure applicator positionable between the track and the rotatable handle, the pressure applicator having a bottom surface configured to apply a pressure on a top surface of the track in response to positioning of the rotatable handle, the pressure applicator having opposing first and second ends defining a longitudinal direction of the pressure applicator, the shaft being positioned at a longitudinal center of the pressure applicator midway between the first and second ends;

a boss portion projecting from the bottom surface of the pressure applicator at the longitudinal center, the shaft passing through the boss portion; and

a slot guide projecting from the bottom surface of the pressure applicator between the boss portion and the first end of the pressure applicator, the slot guide having a pair of opposing slot guide surfaces, the slot guide surfaces being spaced apart from the boss portion and adapted to abut a pair of flanges defining the track slot of the track to orient the pressure applicator on the track.

2. The fastener assembly of claim **1**, further comprising at least one projection configured to mate with scallops in the track to assist in securing the fastener assembly at discrete locations along the track.

3. The fastener assembly of claim **1**, wherein the slot guide surfaces are generally perpendicular to the bottom surface.

4. The fastener assembly of claim **1**, wherein the bottom surface surrounds the slot guide.

5. The fastener assembly of claim **1**, wherein the shaft includes a threaded portion that is operatively coupled to the rotatable handle.

6. The fastener assembly of claim **1**, wherein the shaft and the retainer are unitarily formed.

7. The fastener assembly of claim **1**, further including a main body portion coupled to the pressure applicator, the main body portion adapted to secure loads to the fastener assembly.

8. The fastener assembly of claim **7**, further including a pair of arms extending in opposite directions from the main body portion to secure loads to the fastener assembly.

9. The fastener assembly of claim **1**, wherein a diameter of the rotatable handle exceeds a width of the pressure applicator.

10. The fastener assembly of claim **1**, wherein there is a gap between the boss portion and the slot guide along a longitudinal direction.

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